

Remarks

In an Office Action dated November 17, 2005, claims 15-19 were rejected as being anticipated by Japanese Patent document No. 09-115889 to Shimizu et al. Claim 15 was further rejected as being anticipated by U.S. Patent No. 5,653,808 to MacLeish et al. Claims 16-19 were further rejected as being obvious over the Shimizu et al in view of U.S. Patent No. 6,162,367 to Tai et al. Finally, claim 20 was rejected as being obvious over the Shimizu et al in view of Tai et al and U.S. Statutory Registration H1962 to Peterson et al.

In response, applicants have amended pending claims 15 and 19, and added new claims 21-25. Claims 15-25 are pending for consideration.

Applicants submit that amended independent claim 15 distinguishes over the art of record and in particular Shimizu et al and MacLeish et al. As amended, claims 15 recites in combination, "a spin chuck having a single horizontal surface and being disposed at a bottom portion of said casing, said spin chuck being configured to support the semiconductor substrate" Amended claims 15 further recites in combination, "

a gas injection unit connected to said gas supply unit and disposed on a sidewall of said reaction chamber, said gas injection unit having at least one gas injection opening, each said at least one gas injection opening being oriented such that the gas injection unit injects the process gas, as supplied by the gas supply unit, into the reaction chamber in a structurally unimpeded, horizontal direction substantially parallel to the major upper surface of the semiconductor substrate mounted on the horizontal surface of the spin chuck,

In contrast, Shimizu et al. appear to disclose (in at most an abstract form) a vertically suspended "boat means" holding multiple wafers (15). As this boat means rotates it is sprayed by multiple, laterally disposed "injector means" (5 and 5'). Multiple injector means are required to "uniformly distribute" etching material under "high pressure" since the boat means functions as a substantial structural impediment to the free horizontal flow of etching gas across the major (e.g., working) surface of any one of the wafers loaded into the boat means. Clearly, the disclosure in Shimizu et al does not anticipate or render obvious the invention of amended claim 15, and therefore applicants request withdrawal of this rejection.

Similarly, MacLeish et al also fail to suggest or disclose the invention of amended claim 15. For example, MacLeish et al propose use of a CVD reactor (as

compared with an etching reactor) in which a mechanically collapsing reaction space 34a is feed process gas through multiple large openings formed in lateral bottom portions of the "casing". (See, for example Figure 6 and also Figure 7 specifically illustrating the intended turbulent (and manifestly non-horizontal) flow of gases across the wafer 52. MacLeish et al clearly do not disclose the claimed combination of spin chuck and gas injection unit recited in amended claim 15. Accordingly, applicants request withdrawal of this rejection.

The addition of the Tai et al to Shimizu et al in an obviousness rejection of claims 15-19 adds nothing to a remedy of the deficiencies noted in Shimizu et al. Indeed, Tai et al in every illustrated embodiment teaches a vertical flow of process gas onto a plurality of wafers. Tai et al also fails to teach a rotatable spin chuck, but instead teaches a static vertical rack of wafers. There is absolutely no basis within the art of record to suggest a combination of the vertically suspended, rotating "boat means" described in Shimizu et al. with the static vertical wafer rack of Tai et al. (Nor could there be, given the vertical disposition of the process gas introduction system in Tai et al).

Finally, the proposed additional disclosure of a generic puff valve, e.g., as described by Peterson et al., does nothing to remedy the foregoing deficiencies noted in the art of record. Indeed, resort to Peterson et al is entirely misplaced since it discloses only a puff valve adapted to inject multiple gases within a dense plasma environment. The subject invention is not so much concerned with what type of puff valve may or may not be used, but rather with an ability within an apparatus adapted to etch a polysilicon hard mask from a semiconductor substrate to provide a controlled horizontally oriented flow of process gas across the working surface of the semiconductor substrate. Peterson et al. adds nothing to the ongoing patentability discussion, as puff valve, per se, are admittedly well known.

In some, none of the art of record taken singularly or in combination suggests or discloses the invention of amended claim 15. Thus, in addition to amended claim 15, dependent claims 16-21 are also allowable over the art of record.

This having been said generally, applicants believe that the art of record also fails to suggest or disclose a showerhead arrangement having the orientation recited in dependent claim 19 and new independent claim 22. The art of record also fails to suggest or disclose the oriented exhaust unit of new claim 21.

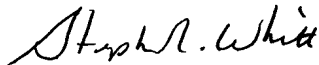
New independent claim 22, which distinguishes over the art of record for at least the reasons set forth above in relation to amended claim 15, also recites, "a spin chuck fixedly seated near the bottom surface of the casing and connected to a rotating motor through the bottom surface of the casing, the spin chuck having a horizontal surface adapted to support a single semiconductor substrate," thereby further distinguishing the disclosures of Shimizu et al., MacLeish et al., and Tai et al.

New dependent claims 23-25 are allowable over the art of record for at least the foregoing reasons.

In sum, the pending claims are allowable over the art of record,

Respectfully submitted,

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A handwritten signature in black ink, appearing to read "Stephen R. Whitt".

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Date: January 27, 2006

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